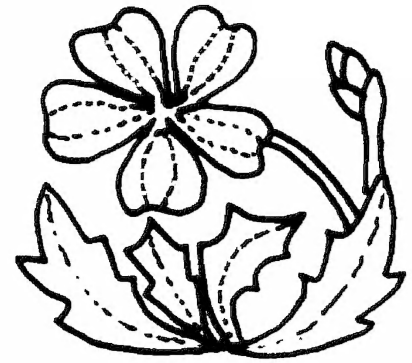


Ballarat Naturalist



Trailing Goodenia
Goodenia lanata
(Club Logo)

Soils, their properties and capabilities

Speaker and report: Shari Wallis, Soil Extension Officer - Department of Primary Industries

Functions of Soil Extension Officers -

- work with landholders managing their soil degradation issues by offering on-site advice, and sometimes funding for ground works and land rehabilitation
- provide community education through certified training courses, information talks, field days, soil pit profile descriptions and interpretations.

The geology and corresponding land use of the Ballarat region

- The Ballarat region is made up of soils derived from four main rock types:
 1. Sedimentary soils from Ordovician marine sediments,
 2. granitic soils from Devonian granite intrusions,
 3. grey basalt from Late Tertiary – Quaternary volcanics and
 4. red volcanic soils from Late Tertiary – Quaternary volcanics.
- The land use of the region corresponds closely to the soil type of the area.
- The Ordovician-age soils are generally low fertility and are not well-drained. These are not suitable for cropping but are best for pasture growth.
- Grey basalt soils have a moderate fertility and are also poorly-drained due to a heavy clay sub-soil. These areas are now being cropped (with the use of raised beds) and used for grazing.
- Granitic soils are only found in small patches across the region, have very low fertility and are only suitable for grazing pastures.
- Red volcanic soils are deep and well-drained with a moderately high fertility. They are commonly used for potatoes and other crops.

Soil properties and their capabilities

- Soil colour can be an indication of both drainage and fertility of the soil. Features such as mottling and buckshot layers indicate a history of waterlogging.
- Soil structure is the arrangement of soil aggregates. Aggregates are made up of various proportions of sand, silts and clays.

- Well-structured soils are friable and have a good proportion of pores or air spaces throughout the profile to allow air, water and root movement through the soil.

Soil degradation issues

- Soil compaction results from heavy trafficking of machinery or stock. This causes a reduction in the size and number of soil pores leading to loss of soil structure and increased water-logging. These problems can be treated, especially when soils are wet, by: reducing movement of stock and machinery across paddocks by: using laneways, controlled trafficking, raised beds, etc.,. Rejuvenating compacted soils is best done using perennial pastures which push deep into the soil structure leaving spaces for air and water movement.
- Dispersive soils are the result of high sodium levels that cause the soil aggregates to break into individual clay particles. Applying gypsum helps overcome dispersive soils by adding calcium to the soil and displacing the sodium ions.
- Tunnel erosion is a common problem in soils with a dispersive sub-soil. Deep-ripping the area to the depth of the tunnels, followed by compacting down and covering with top-soil, generally rehabilitates tunnel erosion. These areas are best excluded from heavy agricultural use as they are very fragile. They may be planted with deep-rooted pasture and be lightly grazed, or better in the long term, they should be planted out with trees and stock excluded.
- Gully erosion can occur in paddocks with poor vegetation coverage due to clearing of native vegetation and/or over-grazing. Gully erosion used to be stabilised using concrete structures but, due to a high failure rate, they are now being replaced by more permeable rock chutes that can move to accommodate any movement of soil underneath.

Excursion to Bacchus Marsh Science and Technology Innovations Centre and Werribee Gorge

Leader: Fran Hanrahan

Twelve members departed for Bacchus Marsh via the freeway, stopping briefly en route at the Ballan exit to identify the geomorphology of the Muckleford and Greendale Faults. From a vertical displacement estimated at 1000-1500m, the upthrown block west of the Muckleford Fault has been reduced by erosion to less than 100m. The freeway continues eastward on the Ballan Sunkland.

The manager of the Centre (which is located behind the secondary college) at Bacchus Marsh, Suzanne Clark welcomed us into the very latest of low energy and sustainable architecture buildings. The centre aims to provide curriculum programs for P-12 students which focus on sustainable environmental development practices, and professional development programs for teachers. Students attend for half or one day programs which may incorporate fieldwork in the local area – Lerderderg and Werribee Gorges, Brisbane Ranges, Long Forest or in the Centre's stormwater filtration ponds – and/or laboratory work in the well-equipped facilities. Students can try tissue culture, test water quality, study soil properties and appreciate the value of seed collecting and the use of endemic

plant species. The principal of the inter-relatedness of all things is emphasised, and the Centre's logo of the Growling Grass Frog - a creature highly sensitive to environmental changes - adorns the large panes of glass.

An agriculture/horticulture lab including micropropagation facilities, demonstration room and interpretive design display areas are complemented by an energy efficient glasshouse and shadehouse, potting shed and horticultural plots (vegetables put in by students were thriving). Toilets use rainwater rather than drinking quality water, with 2 x 25,000litre tanks nearby. Near the entrance to the building a plasma screen shows real-time weather observations from the station outside near the ponds. The building incorporates natural airflow through high and low opening window; double glazing; a "hot-box" above the ceiling created by a black roof where the heated air can be ducted into those spaces requiring heating. Concrete walls provide thermal mass to regulate internal temperatures while gas radiators give the rooms a quick boost first thing in the morning if needed. Colorbond clads the exterior. (But what about all the energy needed to make the steel?) The building has already received four awards from the Royal Australian Institute of Architecture.

The Centre was opened at the start of this year and has already hosted schools from around the state, from as near as Ballarat and as far as Yarrawonga. Whilst it is non-profit-making, fees are charged to cover costs except when grants are provided by promotions like Education Week and National Science Week. The project was inaugurated by the Department of Education and Training. Two teachers and several technical staff are employed and if they demonstrate the bubbling enthusiasm and articulation displayed by Suzanne then the environmental education of the current generation of students is assured.

After lunch beside the Werribee River, we drove along Werribee Vale Road beside irrigated horticultural properties to a weir, upstream of which is an excellent exposure of the Permian glacial tillites (see Fig. 1).

Fig. 1 Permian tillite overlain by Pleistocene rock

Bluff Photos from: *Victorian geology excursion guide* Editors, I. Clark, B. Cook, G.C. Cochrane (tech. ed).

Fig. 2 View of Werribee Gorge from the

These clays contain waterworn pebbles of many different rocks which were carried by the icesheets advancing from the southwest when Australia was located nearer the South Pole

and part of a supercontinent. Rocks found by members included mica schist and quartzite. Overlying the tillite was a distinctive 3m layer of Pleistocene river gravels whose texture and iron-rich colour easily separated it from the whitish-grey tillite, forming an unconformity. (An unconformity is where there is a gap in time and no rocks from intervening eras are represented. In this case no rocks have been laid down in this area for around 250 million years between the Permian era and the Pleistocene era). The steep sides of the gorge were created when the Werribee River was rejuvenated by movement along the Rowsley Fault, resulting in rapid downcutting through the upthrown block.

Retracing our route we drove onto the Bacchus Marsh-Ingliston-Ballan road which for much of its length parallels the south of the railway line. The cuttings which were dug to accommodate the line reveal interesting geological sequences and also provide access to the bush and the Werribee Gorge. At the level crossing, known as Gatehouse 24 we inspected a syncline in the Ordovician shales and sandstones which was adjacent to the contact with more of the Permian tillites. The whole exposure was overlain by Permian sandstone. A simple sequence of the geological events represented just here would be: —

- i. fine muds laid down during the Ordovician period in quiet marine conditions
- ii. muds uplifted, deformed and gently metamorphosed into shale by the intrusion of the Devonian Ingliston granite nearby
- iii. valleys eroded into the new land surface
- iv. Permian icesheet moves over the area and upon melting, deposits clays and pebbles over that land, infilling valleys;
- v. outwash from the receding icesheet deposited sand over the tillites;
- vi. then a gap in time with nothing more deposited until the Tertiary period when lava flows formed today's land surface.

A walk northward into the bush toward the Western Bluff took us through Red Box, Red Ironbark and Golden Wattle. Pigface and Blue Caladenia were seen in bloom; Wedgetailed Eagles circled overhead and abseilers were spotted on a distant cliff. From a spur overlooking the gorge we picked out the flat horizon caused by the most recent outpouring of basalt; a landslide down the face of an Ordovician sedimentary outcrop, and the unconformity between the Ordovician and Tertiary rocks (see Fig. 2). Our final stop was on the south side of the iron bridge carrying the railway over the road where an outcrop of Ordovician shale (outside the State Park boundaries) reveals the fossils of graptolites.

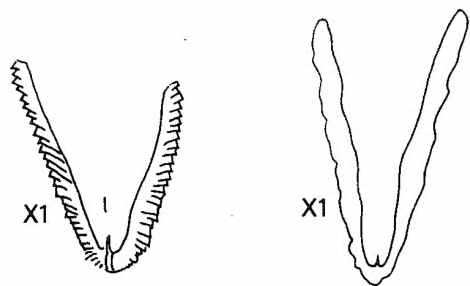
What are graptolites? Some of the most common fossils to be found in Ordovician rocks are graptolites. Typically they are found in black shales, a rock derived from fine muddy sediments ideal for the preservation of animal remains and where there was little water movement to break them up. The remains occur as chitinous films aligned along the bedding planes of the shale and where only gentle metamorphism has occurred; cleavage planes resulting from metamorphism must be parallel to the bedding planes, otherwise the fossils would be destroyed. So we know that they lived in the sea.

Two main groups have been identified:

- a) dendroids which were colonies with hundreds of branches bearing thousands of individual thecae; many were fixed to the sea floor, others floated.

b) graptoloids with a small number of branches or stipes. The abundance of graptoloids in black shale suggests that the majority were free-swimming or planktonic.

Many graptolites were short-lived and widely distributed; as a result they make ideal zone fossils in the Ordovician and Silurian periods, meaning that rocks of the same age can be traced from one continent to another.



Isograptus caduceus var. *maximo-divergens*

Each branch or stipe has thecae arranged on one or both sides, connected internally by a canal; it is thought that each theca contained one minute-plumed animal rather like modern tube worms. However these soft parts are not preserved.

Carol Hall.

FNC Ballarat Minutes of General Meeting 2 September 2005

Apologies from Genny Binns, Pat and Bill Murphy.

Some correspondence.

in: Acknowledgement from Minister for Environment of our support for alpine grazing ban.

out: Invitations for Stella Bedggood Memorial Lecture

General Business

- Carol Hall had brought in Kangaroo Paw rhizomes for members to take..

Show and Tell

- **Ned's Corner** – Claire Dalman: photos of Ned's Corner. John Gregurke, Peter Dalman and Greg Binns commented on an enjoyable 5 days at the Trust for Nature property west of Mildura.

Field Reports

- Fran Hanrahan: at SMB Masked Lapwings made a second nest on the lawn.
- Elizabeth Fitzpatrick: at Malmsbury a pardalote, Yellow Robin, black(?) cockatoos.
- Claire and Peter 1/9 Wendouree – two Ravens very active in front yard, soon saw a small Ringtail Possum run along wire to roof. Ravens chased, New Holland h/eaters, Wattlebird and a few starlings joined in.
- Claire Dalman: 26/8 Two Black Swans on Paul's Wetland. Absence of baby Masked Lapwings at Dowling/Grevillea roundabout noted.
- John Gregurke: 2/9 Wendouree – two Crimson Rosellas, immature Collared Sparrowhawk. At Creswick Golf Course, Common Hovea and Silver Wattle flowering. Golden Bush-pea beginning to flower.
- Lyndsay Fink: 40 Red-browed Finches at Cooke St, Redan.
- John Williams: 26/8 in Stewart St, Ballarat – Australian Hobby on TV aerial in back garden.
- Les Hanrahan: west of Dunolly – Red-capped Robin; Blue Caladenia orchids.

- Carol Hall/Patrick Guay 28/8 1st cygnet of the new season on Lake Wendouree. 4/9 new swan's nest in silt trap pond.
- Carol Hall et al. Council re-landscaping of Fairyland and associated lagoons in progress.

Neds Corner Station Camp

Six members attended the camp at Neds Corner Station from Monday 22 to Friday 26, August 2005. Accommodation was in the shearers' quarters or caravans.

Neds Corner Station is a 30,000 ha property purchased by the Trust for Nature in October 2002. It is adjacent to the Murray Sunset National Park to the west and borders Mulcra Island State Forest near the homestead area. The property is about 85km west of Mildura and protects habitat adjacent to the Murray River for about 27km.

Neds Corner had been used mainly for sheep and cattle grazing since the 1850's. Large areas of the property were saltbush and blue bush plains with corridors of black box and river red gum woodlands, bordering the river. Small areas of mallee and belah were also able to be visited. Since taking ownership of the property the Trust for Nature has removed domestic stock.

Arriving on Monday afternoon there was time to explore the property buildings which comprised shearers' quarters, kitchen, overseer's home, cook's store, wire enclosed meat-storage building, shearing shed, station homestead, ranger's home and sundry other farm buildings. Power was provided by a generator which was started at 8am and turned off at 10pm. Hot water for showers was provided by a wood-fired heater which was very effective. Much of the infrastructure was affected by termites and in a dilapidated condition. Care needed to be exercised, particularly in moving through areas such as the shearing shed.

Photograph by Mark Schapper



On Tuesday the saltbush plains were explored. Property tracks enabled the area to be travelled by car but a 4wd was needed because of recent rains which created boggy areas and high vegetated ridges between the wheel tracks. The country traversed was mostly saltbush plains. Highlights were: sightings of brown songlarks which provided a melodious background as they rose skyward, white winged fairy wrens, white fronted chats, and orange chats which Greg

described as the 'saltbush canary', an apt name as they stood out vividly in the vegetation. There was also a flock of seven emus which came up to the cars to display their curiosity at a book being waved out the window and black faced wood swallows in a patch of belah.

The rangers, Ken and Elaine hosted us around a fire for drinks and nibbles as the sun set. The Murray is more or less their front yard which made it very pleasant.

Wednesday saw our group travelling west along the old mail road and out of Neds Corner to Lindsay Island, a part of the Murray Sunset National Park with the island created by the Murray River and the Lindsay Creek which flows out of and back into the Murray. Sightings included a spotted harrier, pied butcher bird, grey butcherbird and some parrots and rosellas, but the highlight of the day was a pair of red capped robins and their nest of three eggs which was discovered in a lignum bush. It was also interesting to note the variety of water birds on the Murray including pied, little pied and great cormorants, a darter, great and little egrets and pelicans. The Lindsay Island trip bird species total was 46.



Photograph by Mark Schapper

Thursday was time to travel east along the Old Mail Road, a trip which involved a few deviations off road to avoid muddy patches until the locals were seen just charging through the middle after which that path was followed. Along the way the white winged fairy wrens were again observed as well as the brown songlarks which were by now seemingly common. It was about 19km from the homestead to the east boundary where there was a patch of mallee. The identified mallee were Red mallee (*Eucalyptus socialis*), and Acorn mallee (*Eucalyptus osiosa*).

Lunch was spent nearby on the bank of the Murray where the original Neds Corner Station homestead had been located and where there are still a couple of “fisherman’s huts”. Here refuse from years of occupation could be explored including old bottles and china, virtually all broken.

On return, Mulcra Island, a state forest area near the current Neds Corner homestead was visited. A key point of interest was the fish ladder associated with Lock 8. Here 25 concrete enclosures with small gaps control water flow and drop, enabling native fish to find their way past the weir which has about a 2 metre drop. Carp are unable to climb the “ladder”.

It was good to see the current condition of this Trust for Nature property and good to know that such an area of Murray River frontage land has been safeguarded. A return visit in a few years would be good.

Calendar

October

- Fri. 7 Stella Bedggood Memorial Lecture: *Otway Dreaming - Vision for a Natural Park*, by Trevor Prescott, Geelong FNC
Sun. 9 Excursion: Enfield State Park, Leaders: Pat and Bill Murphy
14-18th *SEANA Campout at Mallacoota*, Hosted by Sale and District FNC
Wed. 26 Committee meeting at 1 John St., Wendouree

November

- Fri. 4 *Grevilleas*, by Dr. Elizabeth James, Royal Botanic Gardens
Sun. 6 *Mt. Beckworth*. Leader: Helen Burgess, Club member

Supper duty: November: Volunteers needed
Note-taker: October, November Volunteers needed

Committee

President Mr. Peter Dalman
Vice-President Mr. Greg Binns
Secretary Mrs. Carol Hall
Treasurer Mr. Les Hanrahan

Miss Helen Burgess
Miss Maureen Christie
Mrs. Claire Dalman
Mr. John Gregurke.
Ms Fran Hanrahan (Editor)
Mrs. Pat Murphy

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Meetings are held at the Ballarat Horticultural Centre, cnr. Gregory & Gillies Sts (VicRoads 254 F8) on the first Friday of the month at 7.30pm.

Excursions: Depart from Ballarat Market Place (formerly Creswick Plaza) Creswick Rd., Ballarat (VicRoads 255 M10) at 9.30 am unless otherwise specified.

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